Please ~~**ADD claim 21 as follows:**~~

21. The ion plating device according to Claim 1, wherein the bias power supply unit outputs the pulse bias voltage with a cycle set in a range of 100 kHz to 500 kHz.

REMARKS

Applicants respectfully request reconsideration of this application in view of the present amendments and the following remarks. By this amendment, Claims 1-4, 8, 12, and 17 are elected for prosecution, Claims 1-4 and 8 are amended, with previously independent Claims 2-4 being rewritten as dependent claims, and Claim 21 being added hereby. As a result, upon entry of this amendment Claims 1-4, 8, 12, 17 and 21 are pending and elected for prosecution in this case, with Claim 1 being an independent claim. Because the application as originally filed contained 8 independent claims and 50 total claims (including multiple dependencies), and now contains only 5 independent claims and 51 total claims (including multiple dependencies), it is believed that no additional fees are due for the consideration of this paper. However, if additional fees are due, the Commissioner is authorized to charge such fees to deposit account number 13-2855. A copy of this paper is enclosed.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned **"Attachment A: Version With Markings To Show Changes Made."**

Response to Restriction Requirement

In the October 28, 2002 Office Action, the Examiner issued a restriction requirement alleging that the application contained the following separate and distinct inventions:

Group I:	Claims 1-17 drawn to an apparatus classified in class 118, subclass 723E; and
Group II:	Claims 18-20 drawn to a method classified in class 427, subclass 523.

The Examiner's restriction requirement requires the applicants to elect a single invention from the following species:

Species 1: Fig. 1, pages 11-14;

Species 2: Fig. 3A, page 16;

Species 3: Fig. 3B, page 17; and

Species 4: Fig. 3C, pages 17 and 18.

In accordance with the prior provisional election made with traverse by applicants' attorney, Richard Anderson, on October 22, 2002, in response to the Examiner's restriction requirement, the applicants elect the invention of Species 1 (claims 1-5, 8, 12 and 17), with traverse, for prosecution on the merits at this time.

Applicants request that the restriction requirement be reconsidered because the Examiner has not shown that a serious burden would be required to examine all of the claims. M.P.E.P. § 803 provides:

> If the search and examination of an application can be made without serious burden, the Examiner **must** examine it on the merits, even though it includes claims to distinct or independent inventions. (*Emphasis added.)*

Thus, for a restriction to be proper, the Examiner must satisfy the following two criteria: (1) the existence of independent and distinct inventions (35 U.S.C. § 121); and (2) that the search and examination of the entire application cannot be made without serious burden. See M.P.E.P. § 803.

The Office Action has not shown that the **second** requirement has been met. Specifically, the Examiner has not shown that it would be a serious burden to search and examine all of the groups together. A search relating to the ion plating apparatus of Group I would significantly overlap with the search required for the ion plating method of Group II, and the Examiner has not shown that an undue burden would be produced by the combined search. Consequently, reconsideration and modification or withdrawal of the restriction is requested.

Substitute Drawing Figure 4

The applicants request entry of the following change to the drawings. Specifically, the applicants request permission to designate Figure 4 with the legend --PRIOR ART-- as shown in the corrected version of Figure 4 included herewith as Attachment B with the correction highlighted in red ink.

Claim Rejections Under 35 U.S.C. § 112

Claims 1-5, 8, 12 and 17 were rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicants regard as the invention. Reconsideration is respectfully requested in view of the present amendments. Claim 1 is amended to more clearly recite that the ion plating device includes a power supply unit having an RF power unit and a bias power supply unit connected to a substrate holder in parallel. Claims 2-4 are amended to depend from Claim 1 either directly (Claims 2 and 3) or indirectly (Claim 4). Consequently, the amendments to claim 1 also apply to the claims 2-4. It is respectfully submitted that the claims as amended more clearly indicate the manner in which the power supply unit is coupled to the substrated holder and, therefore, applicants respectfully request withdrawal of the rejection under 35 U.S.C. § 112, second paragraph with respect to pending claims 1-4, 8, 12, 17 and 21.

Claim 8 was further rejected under 35 U.S.C. § 112, second paragraph as being indefinite for having insufficient antecedent basis for the limitation of a "second" low pass filter. Claim 8 is amended hereby to recite an ion plating device having a low pass filter for which no additional antecedent basis is required and, therefore, applicants respectfully request withdrawal of the additional rejection under 35 U.S.C. § 112, second paragraph with respect to pending claim 8.

Claim Rejections Under 35 U.S.C. § 103

Claims 1-4, 8, 12 and 17 were rejected under 35 U.S.C. § 103(a) as being obvious over the admitted prior art of Figure 4 in view of either Yamada (JP 10-4085 A) or Okano et al. (JP 56-81678 A). Applicants respectfully submit that Claim 1 as amended and claims 2-4, 8, 12, 17 and 21 depending therefrom would not be properly rejectable over the applied

references for the following reasons. Claim 1 is further amended to more clearly recite an ion plating device in which the RF power unit and the bias power supply unit of the power supply unit are connected to the substrate holder in parallel for supplying a bias voltage to the inside of the vacuum chamber simultaneously with the power supplied by the RF power unit. The device disclosed by Yamada is a plasma etching device, whereas the device described in Claim 1 is an ion plating device. Applicants submit that the Yamada plasma etching device would not be combined with the admitted prior art ion plating device of Figure 4 by a person skilled in the art to arrive at the device of Claim 1 for the reasons discussed hereinafter.

In Claim 1, the RF voltage (power) and the bias voltage are supplied simultaneously to the substrate holder. Specifically, for the formation of a film using the ion plating technique, plasma is required to be stable. For this reason, the RF voltage is required to be supplied continuously to the substrate holder during film formation. With this condition being met, charge-up must be prevented by periodically varying the bias voltage between a negative voltage and a positive voltage in a pulse-like manner. With this configuration, the film forming material can be ionized by plasma formed through the RF voltage, and the ionized material is accelerated by the bias voltage and continuously deposited on the substrate for film formation. Furthermore, during the above process, the film can be prevented from any damage due to charge-up.

On the other hand, in the plasma etching device according to Yamada, an RF voltage and a positive bias voltage are supplied alternately to a substrate support. In the embodiment of Fig. 1, Yamada appears to disclose RF AC power supply 6 and DC power supply 7 operatively connected to a substrate susceptor 2 by a circuit changing switch 4. (Yamada ¶ 0018). The circuit changing switch 4 alternates between the RF AC power supply 6 and DC power supply 7 at a rate of 10 Hz so that only one of the power supplies 6 and 7 is applied to the substrate susceptor 2 at a time. (Yamada ¶ 0018 and Figs. 2A, 2B and 2C). In an alternate embodiment, Yamada appears to disclose omitting the switch 4, while still alternately applying the RF AC power supply 6 and DC power supply 7. Alternating the power supplies in this way, the plasma is not stable, and film forming can not be stably carried out even if etching can be stably carried out. Accordingly, Yamada teaches away from an ion plating

device as recited in Claim 1 wherein the bias voltage is supplied to the substrate holder simultaneously with the RF voltage.

Furthermore, as recited in Claim 1, the bias voltage is varied in a cycle range of 1 kHz to 1 GHz. Below 1 kHz, an electric field causing breakdown is formed before the charges of ions captured in the vicinity of the substrate are neutralized at low pulse frequencies. Above 1 GHz, adjustment of the timing at which the pulse bias is applied becomes difficult. Accordingly, the cycle range of 1 kHz to 1 GHz recited in Claim 1 reflects a range that may be required to avoid breakdown during ion plating process, and thus not simply typical values selected for bias voltage supply.

Conversely, Yamada discloses that an upper limit value of duration of positive DC voltage application (in other words, period) is determined based on a time for plasma not to disappear, a consideration which is different from that of Claim 1 in which an upper limit value of the cycle of the pulse bias is determined based on the difficulty of the adjustment of timing at which the pulse bias is applied. The timing issue arises in the ion plating device of Claim 1 because the RF voltage and the bias voltage are simultaneously applied. Thus, Yamada does not disclose the cycle range of 1 kHz to 1 GHz of the bias voltage in an ion plating device as recited in Claim 1. Similarly, one skilled in the art would not be motivated to combine the prior art ion plating device with the plasma etching device of Okano et al. to arrive at the ion plating device of Claim 1.

Okano et al. disclose a plasma etching device in which a high frequency voltage on which a direct current bias voltage is superimposed is applied to an electrode 13 holding a substrate. However, neither a waveform of the bias voltage nor a cycle range of a pulse bias is disclosed for the plasma etching device. Although the Examiner states that the cycle range of the bias voltage is merely typical values, this is not the case as already described above. Therefore, Okano et al. do not teach either an ion plating device as recited in Claim 1 in which the bias voltage periodically varying between a negative voltage and a positive voltage in a pulse-like manner is supplied to the substrate holder simultaneously with the RF voltage, or an ion plating device having a cycle range of 1 kHz to 1 GHz for a bias voltage.

The remaining references applied by the Examiner similarly do not appear to either disclose or suggest an ion plating device as recited in claims 1-4, 8, 12, 17 and 21. It follows, therefore, in the opinion of the applicants that the applied references neither anticipate nor render obvious claims 1-4, 8, 12, 17 and 21. See *In re* Oetiker, 24 U.S.P.Q.2d 1443, 1446 (Fed. Cir. 1992); *Ex parte* Clapp , 227 U.S.P.Q. 972, 973 (Bd. Pat. App. 1985) (the prior art must make a suggestion of or provide an incentive for the claimed combination of elements in order to establish a prima facie case of obviousness). Because the applied references do not appear to teach or suggest an ion plating device in which power from an RF power unit and a bias power supply unit are applied simultaneously to a substrate holder, and with a cycle range of 1 kHz to 1 GHz for the bias voltage, the applicants respectfully submit that claims 1-4, 8, 12, 17 and 21 are now in condition for allowance, and the applicants respectfully request allowance of these claims at the Examiner's earliest convenience.

Regarding to Claim 2, the ion plating device in Claim 1 is characterized in that "a ratio of the predetermined time of the pulse bias to the cycle of the bias voltage is 40% or less." When the ratio is larger than 40%, the plasma may be attenuated, which may result in reduced efficiency of film formation. Accordingly, with this ratio, film formation can be stably carried out while applying the pulse bias. Neither Yamada nor Okano et al. disclose or suggest a ratio as recited in claim 2. Therefore, for this additional reason, the invention of Claim 2 is not rendered obvious by the prior art of the present application in view of either Yamada or Okano et al.

Regarding to Claim 21, the ion plating device in Claim 1 is characterized in that "the bias power supply unit outputs the pulse bias voltage with a cycle set in a range of 100 kHz to 500 kHz." As described above, neither Yamada nor Okano et al. disclose or suggest this cycle range of the pulse bias voltage in an ion plating device as recited herein. Therefore, for this further reason, the invention in Claim 21 of the present application is not rendered obvious by the prior art of the present application in view of either Yamada or Okano et al.

For at least the foregoing reasons, reconsideration and withdrawal of the rejection of the claims and allowance of the currently pending claims are respectfully requested. Should the Examiner wish to discuss the foregoing or any matter of form in an effort to advance this application towards allowance, she is urged to telephone the undersigned at the indicated number.

Dated: January 28, 2003

Respectfully submitted,

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Attachment A: Version With Markings to Show Changes Made

In the Claims:

Claims 1-4 and 8 have been amended as follows:

1. (Amended) An ion plating device comprising:

a vacuum chamber adapted to be evacuated;

a substrate holder placed in the vacuum chamber for holding a substrate; and

a power supply unit including an RF power unit connected to the substrate holder for supplying power to an inside of the vacuum chamber through the substrate holder for changing a film forming material into a plasma and for depositing the film forming material from the plasma on the substrate and a bias power supply unit connected to the substrate holder in parallel to the RF power unit for supplying a bias voltage to the inside of the vacuum chamber through the substrate holder simultaneously with the power supplied by the RF power unit, wherein [a power supply unit for supplying power used for changing a material of a film to be formed on the substrate into a plasma and depositing the film from the plasma on the substrate to an inside of the vacuum chamber through the substrate holder, wherein]

the bias power supply unit outputs the bias voltage composed of a negative bias component having a predetermined negative voltage value for a predetermined output time and a pulse bias component corresponding to a pulse output having a positive voltage value for a predetermined time with a cycle set in a range of 1 kHz to 1 GHz. [the power supply unit includes a bias power supply unit for outputting a bias voltage composed of a negative bias component having a predetermined negative voltage value for a predetermined output time and a pulse bias component corresponding to a pulse output having a positive voltage value for a predetermined time, with a cycle set in a range of 1 kHz to 1 GHz.]

2. (Amended) The [An] ion plating device according to Claim 1, wherein [comprising:

a vacuum chamber adapted to be evacuated;

a substrate holder placed in the vacuum chamber for holding a substrate; and

a power supply unit for supplying power used for changing a material of a film to be formed on the substrate into a plasma and depositing the film from the plasma on the substrate to an inside of the vacuum chamber through the substrate holder, wherein

the power supply unit includes a bias power supply unit for outputting a bias voltage composed of a negative bias component having a predetermined negative voltage value for a predetermined output time and a pulse bias component corresponding to a pulse output having a positive voltage value for a predetermined time, with a cycle set in a range of 1 kHz to 1 GHz, and]

a ratio of the predetermined time of the pulse bias to the cycle of the bias voltage is 40% or less.

3. (Amended) The [An] ion plating device according to Claim 1, wherein [comprising:

a vacuum chamber adapted to be evacuated;

a substrate holder placed in the vacuum chamber for holding a substrate; and

a power supply unit for supplying power used for changing a material of a film to be formed on the substrate into a plasma and depositing the film from the plasma on the substrate to an inside of the vacuum chamber through the substrate holder, wherein

the power supply unit includes a bias power supply unit for outputting a bias voltage composed of a negative bias component having a predetermined negative voltage value for a predetermined output time and a pulse bias component corresponding to a pulse output having a positive voltage value for a predetermined time, with a cycle set in a range of 1 kHz to 1 GHz, and]

the pulse output of the pulse bias is a square wave [pulse having a pulse width for the predetermined time and a predetermined voltage value].

4. (Amended) The [An] ion plating device according to Claim 2, wherein [comprising:

a vacuum chamber adapted to be evacuated;

a substrate holder placed in the vacuum chamber for holding a substrate; and

a power supply unit for supplying power used for changing a material of a film to be formed on the substrate into a plasma and depositing the film from the plasma on the substrate to an inside of the vacuum chamber through the substrate holder, wherein

the power supply unit includes a bias power supply unit for outputting a bias voltage composed of a negative bias component having a predetermined negative voltage value for a predetermined output time and a pulse bias component corresponding to a pulse output having a positive voltage value for a predetermined time, with a cycle set in a range of 1 kHz to 1 GHz, and

a ratio of the predetermined time of the pulse bias to the cycle of the bias voltage is 40% or less, and]

the pulse output of the pulse bias is a square wave [pulse having a pulse width for the predetermined time and a predetermined voltage value].

8. (Amended) The ion plating device according to any of Claims 1 to 4, wherein

the bias power supply unit comprises a direct current power supply for forming the negative bias and an impulse train power supply for forming the pulse bias, further comprising:

a [second] low pass filter provided between the direct current power supply and the substrate holder, for passing an output of the direct current power supply therethrough toward the substrate holder and preventing an output of the impulse train power supply from being input to the direct current power supply; and

a band pass filter provided between the impulse train power supply and the substrate holder, for passing an output of the impulse train power supply therethrough toward the substrate holder and preventing an output of the direct current power supply from being input to the impulse train power supply.

Claim 21 has been added as follows:

21. The ion plating device according to Claim 1, wherein the bias power supply unit outputs the pulse bias voltage with a cycle set in a range of 100 kHz to 500 kHz.

ATTACHMENT B